SEA SCALLOP INVESTIGATIONS

The sea scallop fishery has been expanding rapidly since 1945 and is now the most valuable of the New England offshore fisheries. Pressure on the Georges Bank stocks has also increased recently with the expansion of the Canadian offshore sea scallop fleet.

When the present investigation was started, there was very little known of the biology of the animal or of the condition of the exploited stocks. We now have good estimates of growth and mortality rates in the catchable sizes and programs set up to measure the removals and evaluate the effects of changes in fishing practice. There is evidence that the older year-classes of larger animals have been fished out and that the fishery is heavily dependent upon the smallest catchable year-class. Population dynamics calculations indicate an increase in yield will result from a postponement of first capture, and a management program is being considered.

Nothing is known about the sea scallop from the time the eggs are spawned until they reach about 10 mm, and very little from this size to about 60 mm. It is during this period that the physical and biological environment presses most heavily on the stocks. Future expansion of this investigation will be concerned with these stages of the life history.

SEA SCALLOP INVESTIGATIONS

List of Projects

- 1. Basic statistics
- 2. Sampling at sea
- 3. Survey of grounds
- 4. Strength of pre-recruits
- 5. Growth from tags
- 6. Shell structure
- 7. Growth from rings
- 8. Total mortality from L-F
- 9. Fishery mortality from tags-
- 10. Natural mortality
- 11. Mesh selection
- 12. Population dynamics
- 13. Aquarium
- 14. Ring formation
- 15. Gametogenesis
- 16. Spat collection
- 17. Variation in length-weight ratio
- 18. Larval culture
- 19. Temperature on larvae
- 20. Temperature on adult growth

- 21. Food on larvae
- 22. Vertical distribution of larvae $\sqrt{x^2}$
- 23. Salinity on growth with well as
- 24. Food of adults
- 25. Survey of immature
- 26. Formation of beds
- 27. Predators
- 28. Hydrography and year-class strength
- 29. Middle Atlantic beds

SUMMARY CONTROL SCHEDULE

Investigation: Sea Scallops
Biological Laboratory: Woods Hole, Mass.

Danison Astu	Est.*					Fiscal	Years	S			
aron operations	Cost	57	58	59	09	19	62	63	70	65	99
1. Basic statistics of the sea scallop fishery	78.8	11.07.	6	6.1 7.	. 5	7,1	8,4	6.7	7.0	7.0	10.1
2. Sampling the commercial catch at sea	68, 7	9, 2	5.0	5.1	6, 1	6.4	7.9	6,2	6.5	6.7	9.6
3. Survey of the sea scallop grounds	157.1	14. gr	910.3	9.4	12.7	17.0	Ŧ	17.217	rC	18.6	1.4
1. Strength of pre-recruit year class	34, 6	-	¥ 1	3, 0	4.1	4, 1	5.4	3, 6	3, 9	3, 9	6,6
5. Growth from tage returns	27.5	8.4	6.9	6.1	6.1		11 71	1	1 1		
6. Structure and formation of the shell ligament	14, 3	I I	6, 8	4,4	3, 6		1	Î Î	† 1	1	1
7. Growth from rings	53.9		1	4,1	6.8	6.4	6.4	6, 1	6.5	6.6	9.5
8. Total mortality from L-F distribution analysis	34.8	-	-	3.0	4.11	4.2	5.3	3.6	3.9	4.0	6.7
9. Fishery mortality from tag returns	25.7	-	5.6	3.7	4.8	5.2	6.4	1	1		1
10. Natural mortality rate	30,8	1		2.5	3.6	3.7 4	4.8	3.1	3.4	3.5	6 2
11. Size selection of sea scallop dredges	16.9	-	5.2	3.0	4.1	4.6	!	;	!	1	
12. Population dynamics of G.B. sea scallop fishery	26.9	8.4	5.94	9	4	4.5	-	i,	1	;	1
13. Design and construction of temperature-controlled experi-	3, 5	ŀ	1	3.5	!	1		-	!	: :	1
1). Ring formation	11.8	!	-	3, 5	4.2	4,1	1	1	-	1	:
15. Gametogenesis and spawning seasonal cycles	8,3		-) 	4.2 4.	1, 1	! !	!			:
			-	-	-	_	-	-		-	

SUMMARY CO. .OL SCHEDULE

Investigation: Sea Scallops Biological Laboratory: Woods Hole, Mass.

									7	,			
	Project Title		Cost	57	82	59	09	19	62 (63	719	. 39	99
16. Spat collection			13.5	1	1	2.7	5.0	5.8	1	1	1	!	1
17. Variation in ler	noth-weight ratio by season	and area	14.4	-	1		4.2	4, 5	5.7	1	1	1	!
18. Larval culture			8,9	I I	1	!	4	4.5	!	!	:	1	1
19. Temperature effe	Temperature effect upon largal mortality and	growth rates	21, 1	1			,	2	7.9	5.7		1	1
	ոժույ է տոսաեր		20.0			!		-	6	5.9	6.2	1	1
			22.7	1	-			1	6	6.9	6.9	1	1
l	hition of lamme		23, 5	ı	1		1	8, 2	8,9	6.4	1	-	1
23. Salinity on croath	din in the second secon		15.8	1		-	1 1	 ¦	6	6.9	!	·	;
0). Bood of odis1+#			21.2	1	1	-	1	1	1	6.9	7.1	2	1
Of Summer of amortin			37, 7					i i	1 1		10.6	11.71	15.4
26. Formation of heds	מלים		15, 3		!		1	1	1	1	ı I	6.4	8.9
On Produting			15.9	-		-	!	I I		!	!	6.59	'
28. Hydromanhy and wearsee strength	west-reading attention		28.6	1	<u>'</u>	-	1	1		1	8.5		1.4
ニャッパ ・	1 TO A.		11.0	1 1	!	1	1	1 1		1	1	Т	1.0
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					1	1	1	+	+	1	Ì		T
	Investigation	Total.	863.7	51.8	553.654°.		89.6	101.91	.9112.485	2	88.0	0 90.8126.	26.2
	Annual Review										7	Date	
Laboratory	Regional or Area Office	Washington Office	ce	Pre	Prepared by:	by:	Je Ae	Pos	Posgay		8	8/6/28	T
				Rec	ommen	Recommended by	::1				T i	Date	1
				Lal	Di.	Lab. Director	J	Herbert	art. W	Graham	ı	/6/29	
				Rec	0.7	Reg. or Area	Dire	P. P.	など	Lune	ningher	3	
				Br	Branch Chief	hief		5	32	11. 12	12.24.55	2	
				App	Approved by:	by:			*			.	
							Division	- 1	Chief	for	Director	No.	1
													T
													T
			1										7

*Total needed by Laboratory for Project in theusands of dollars.

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959

Filo No.

Research Project Outline

Title of Project: Basic statistics of the Sea Scallop Fishery
Investigation Title: Sea Scallop
Investigation Chief: J. A. Posgay
Project Leader: F. E. Nichy Fishery Research Biologist. GS-7 Name Title Grade
Assistants: (Title and Grade) Vacant - Statistical Clerk GS-4
Collaborators:
Necd for Information: To keep the state of the fishery under continuous review in order to become aware of any changes in location and abundance.
Objective: To measure the removals in number and weight from all the fishing grounds.
Mothed of Procedure:

Phase 1: Compile data on catch and effort by unit area on punch cards. Prepare monthly, quarterly and annual summaries. Compile and tabulate data on size and age composition of the landings. Calculate the numbers removed.

Sea Scallop - 1

Shoet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	l Needed by Labo	ratory for Complete Preje	78.8
	FY 1959	FY <u>1960</u>	FY 1961
Personal Services Other Expenses:	3.8	3.7	3.8
Within Project	0.2	0.2	0.2
Lab. Adm. & Ser.	2.1	3.6	3.1
Lab. Total	6.1	7.5	7.1
Regional Office Washington Office	.061	.075	.071
Total			
Recommended Source of Francisco Recommended Source of Francisco Recommended Source of Complete Recommended Source of Francisco Recommended Source of Francisco Recommended Source of Francisco Recommended Source of Francis		X and Regular (S-K, Regular, Contribut Y; Phase 2 FY; Phase	•
Recommended by:	. Posgay	January January	7110Ject F1 Date 8/6/59
Investigation Chief	J. A.	Posgay	8/6/59
Laboratory Director	Herbe	rt W. Graham	8/6/59
Regional Director	Joseph	4 Princetian	8/19/59
Branch Chief	/1 I .	HHF.	12-24-59.
Approved by: Division Chief for Dir	rector		

Remarks

(Continue on reverse side)

This looks like a data collection.

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 File No.

Research Project Outline

Title of Project:	Sampling the com	mercial catch at se	ea	
Investigation Tit	le: <u>Sea Scallop</u>	andreas a company and the second state of the	nin a 1987, iku igi sa saddililindayaga, amadaanyigaa, aggapaa	and the same of
Livestightion Chi	ef: J. A. Posgay			
Project Leader:	F. E. Nichy	Fishery Research	Riclogist	GS-7 Grade
Assistants: (Tit	le and Grade)			
Vacant - Stati	stical Clerk GS-4			
Collaborators:	Various commercial	fishermen		
mider Agritol	tion: The cull point us conditions, must be recommendation.	t, as well as the k be known to predict	mind and amou the effect	ant of discard of any

Mothod of Procedure:

Phase 1: To send observers aboard commercial scallepers fishing with standard gear as well as experimental gear. To have fishermen bring in special collections of scalleps taken with dredge liners and with standard gear.

To measure the L-F of the catch, discards and landings under the

conditions of normal commercial practice.

Phase 2:

Objective:

Shcet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	l Needed by Laborate	ory for Complete Projec	68.7
	FY 1959	FY 1960	FY_1961
Personal Services	2.5	2.5	2.7
Other Expenses: Within Project	0.5	0.5	0.6
Lab. Adm. & Ser.	2.1	3.1	3.1
Lab. Total	5.1	6.1	6.4
Regional Office Washington Office	•051	.061	•064
Total			
Recommended Source of Fi	(Š.	-K, Reguler, Contribute	
Estimated Date of Comple	etion: Phase 1 FY	Phase 2 FY; Phase	3 FY ; Project FY
Recommended by: Originator J. A. Po	osgay		8/6/59 <u>Date</u>
Investigation Chief	J. A. Posg	ay	8/6/59
Laboratory Director	Herbert W	Graham	8/6/59
Regional Director	Joseph F. C	unage trai	8/19/59
Branch Chief_	() 1 241	HE	12-24-59
Approved by: Division Chief for Dir	rector		

Remarks

(Continue on reverse side)

This looks like a data belection project. Should be continuing.

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 Date: File No.

Research Project Outline

Title of Projec	Survey of the Sea Scallop grounds
Investigation T	tle: Sea Scallop
Investigation Cl	nief: J.A. Posgay
Project Leader:	J. A. Posgav Fishery Research Biologist GS-12 Name Title Grade
Assistants: (T	tle and Grade)
	l Fishery Research Biologist GS-7 Fishery Research Biologist GS-7
Collaborators:	
Necd for Inform of pre-rec rates.	tion: To provide the data necessary for calculating the strength ruit and exploited year classes, natural and fishing mortality
	collect length and age frequency data from the fishing grounds with ndard and experimental gear.
Mothed of Procee	dure:
	make three regularly scheduled sampling cruises each year aboard chartered fishing vessel:
Phase 2:	May 10 days July 7 days September 10 days

Shcet No. 2

Filc No.:

Mothod of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Tota	l Needed by Laborat	ory for Complete Project	157.1
	FY <u>1959</u>	FY <u>1960</u>	FY 1961
Personal Services	1.4	1.6	2.9
Other Expenses: Within Project	6.0	8.0	11.0
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	9.4	12.7	17.0
Regional Office Washington Office	•094	.127	.17
Total			
Recommended Source of F Estimated Date of Compl	(5	Regular -K, Regular, Contributed, ; Phase 2 FY ; Phase 3 F	
Recommended by:	. A. Posgay		8/6/59 Date
Investigation Chief	J. A. Posg	ay	8/6/59
Laboratory Director	Herbert W	Graham	8/6/59
Regional Director_	Joseph 4. U	unerties	8/19/59
Branch Chief	01,3	HE	12-24-59
Approved by: Division Chief for Di	rector ///	4	

Remarks

(Continue on reverse side)

Data bellection?

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959

File No.

Research Project Outline

		. Tro, jeou caurine	
Title of Project	Strength of the	pre-recruit year clas	S
Investigation Ti	tle: Ses Scallop	olitions (Military Procedure (Military (Military))) (Military) (Military) (Military) (Military) (Military) (Military)	makindan selakin salaman parasan alah seringan pagabagan pagabaga
Investigation Ch	nief: J. A. Posgay		
Project Leader:	J. A. Posgay Nome	Fisher: Research Bio Title	logist GS-12 Orade
Assistants: (Ti A. S. Merrill F. E. Nichy	tle and Grade) Fishery Research Bio Fishery Research Bio	ologist GS-7 ologist GS-7	
Collaborators:			
Need for Informa available t	tion: To predict the to the dishery.	future supply of the	resource which will be

Objective: To predict the relative strength of the incoming year class at least one year before it enters the fishery.

Method of Procedure:

Sample the area at regular intervals with standard, small mesh gear. Phase 1: Compare strengths of successive year classes. Measure yields after they enter the dishery. Make predictions.

Sea Scallop -4
Shoet No. 2

Filc No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Tota	l Needed by Laborat	ory for Complete Project	34.6
	FY 1959	FY 1960	FY 1961
Personal Services Other Expenses: Within Project	1.0	1.0	1.0
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	3.0	4.1	4.1
Regional Office Washington Office	.03	.041	.041
Total			
Recommended Source of F . Estimated Date of Compl	(S.	-K, Regular, Contributed,	
Recommended by: Originator	A. Posgay		<u>Date</u> 8/6/59
Investigation Ch ief	J. A. Posga	y `	8/6/59
Laboratory Director	Herbert W.	Graham	8/6/59
Regional Director	Joseph & lu	MUCCHALL .	8/19/59
Branch Chief Approved by: Division Chief for Di	rector	1	12-24-57

Remarks

(Continue on reverse side)

Data lallection?

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 File No.

Research Project Outline

		مريب ومجموعة ميارية	The state of the s	
Title of Pro	ject: <u>Growt</u>	rate from	tag returns	
Investigatio	on Title: Sea	Scallop	antiqui e rigini pierzas del mantin de la referaba le . Libera aproba de la porte de la probaba le la parte de	
Investigation	on Chief: J.	A. Posgay		
Proje <mark>ct</mark> Lead	der: F.	E. Nichy	Fishery Research Biol	ogist <u>GS-7</u> Grade
Assistants:	(Title and Gr	ade)		
Vacant - 3	Statistical Cle	rk GS-4		
Collaborator	rs:			
Need for Int effect	formation: One s of fishing o	of the bas n the stock	ic parameters necessar s.	y for assessing the
Objective:	To determine the grounds. Valid	ne annual gr date the ann	routh rate in the most nual ring method.	important fishing

Mothod of Procedure:

Phase 1: Tag and release large numbers of sea scallops. Measure the growth increment on the recaptured specimens and calculate the annual rates for each area.

Shoet No. 2

Filc No.:

Mothod of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	l Needed by Laborator;	for Complete Project	27.5
	FY 1959	FY <u>1960</u>	FY 1961
Personal Services	2.5	1.4	M EI
Other Expenses: Within Project	1.6	0.6	Çind Sand
Lab. Adm. & Ser.	2.0	4.1	ével écol
Lab. Total	6.1	6.1	
Regional Office Washington Office	.061	.061	
Total			
Recommended Source of Fu		d Regular Regular, Contributed	, ∈tc.)
Estimated Date of Comple	etion: Phase l FY ;	hase 2 FY ; Phase 3 1	Y Project IY60
Recommended by: Originator J.	A. Posgay	***************************************	8/6/59 <u>Date</u>
Investigation Chief	J. A. Posgay		8/6/59
Laboratory Director	Herbert W. Gra	ham	8/6/59
Regional Director	Joseph 4. Vic	worther	8/19/59
Branch Chief	VI JUE		12-24-59
Approved by: Division Chief for Dir	ector // Court		10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

Remarks

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 File No.

Research Project Outline

Title of Project:	Structure and form	ation of the shell	ligament.	
Investigation Title:_	Sea Scallop	and process of the second section of the section of the second section of the section of the second section of the sec		
Investigation Chief:_	J. A. Posgay			
Project Leader:	A.S. Merrill	Fishery Research Title	Biologist	GS-7 Grade
Assistants: (Title a	nd Grade)			
Vacant - Fishery A	id GS-4			
Collaborators:				
Necd for Information: is necessary for various fishing	r establishing gro	determining the age wth rates and year	of an ind class stre	ividual scallop ngths of the
Objective: To estable by annual	ish the presence, phenomena	cause and time of	formation	of marks caused
Mothod of Procedure: Phase 1:	Sectioning and examnuals collected	camination of the s lat various times	hells and i and places	ligaments of

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	Needed by Laborato	ry for Complete Project	14.8
	FY 1959	FY <u>1960</u>	FY 1961
Personal Services	2.0	0.5	proj proj proj
Other Expenses: Within Project	0.4		
Lab. Adm. & Ser.	2.0	3.1	prof free
Lab. Total	4.4	3.6	(Carl (Carl
Regional Office Washington Office	•044	•036	
Total			
Recommended Source of Fu	(S-	Regular K, Regular, Contributed,	
Estimated Date of Comple Recommended by: Originator	J.A.Posgay	;Phase 2_FY;Phase 3_F	Y ; Project FY 60 8/6/59
Investigation Chief	I. A. Posgav	J.	8/6/59
Laboratory Director	Herbert W. (8/6/59
Regional Director	Joseph G.	Pennere Lear	8/19/59
Branch Chief You Approved by: Division Chief for Dire		¥Ę.	12-24-59

Remarks

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 File No.

Research Project Outline

Title of Project: Grow	th rate from ann	ual rings			
Investigation Title:		different affensalle for effektive (), also energy on self, sense . negyption		**	
Investigation Chief:	J. A. Posgay	ndahlaman salahin 1904 (1905) sajah ngabangan kalayan salah		·	
Project Leader:	A.S. Merrill	Fishery Research Title	n Bi ol ogist	GS-7 Grade	
Assistants: (Title and Vacant - Fishery Aid		÷)			
Collaborators:					
Need for Information: effect of fishing o	One of the basic on the stocks.	parameters nece	esary for as	sessing the	
Objective: To determine out its rang	e the aver age ann ge•	ual growth rate	of the sea s	c all op th ro ugh	ì - -
	Collect samples the growth increase growth rate.	of shells, locat ments between ri	e the annual ngs, calcula	rings, measur te the average	е

Mothed of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Tota	l Needed by Laborator	y for Complete Project	53.9
	FY <u>1959</u>	FY <u>1960</u>	FY 1961
Personal Services	2.0	3.0	3.1
Other Expenses: Within Project	0.1	0.2	0.2
Lab. Adm. & Ser.	2.0	3.6	3.1
Lab. Total	4.1	6.8	6.4
Regional Office Washington Office	.041	•068	.064
		ومجاليط والمراجع والم	
Potal	handa		
Recommended Source of E	(S-K	, Regular, Contributed Phase 2 FY ; Phase 3	
Recommended Source of F Estimated Date of Complecommended by:	(S-K		
Recommended Source of F. Estimated Date of Completecommended by: Originator J.	(S-K etion: Phase 1 FY59 ; A. Posgay	Phase 2 FY ; Phase 3	FY Project FY Date
Recommended Source of F Estimated Date of Compl Recommended by:	(S-K etion: Phase l_FX59;	Phase 2 FY ; Phase 3	FY; Project FY 8/6/59 Date
Recommended Source of F Estimated Date of Completecommended by: Originator Investigation Chief	(S-K etion: Phase 1 FY59 ; A. Posgay J. A. Posga	Phase 2 FY ; Phase 3	FY ; Project FY 8/6/59 8/6/59

Remarks

(Continue on reverse side)

please check Completion schedule.

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959
File No.

Research Project Outline

Title of Project: <u>T</u>	otal mortality ra	ate from analys	is of L-F	distribution	
Investigation Title:	Sea Scallop	andright confidence community are accorded to compare and a	ist, makeure – magigapatania neverio (tersapisko : entata tambatua		
Investigation Chief:	J. A. Posgay				
Project Leader:	F. E. Nichy	Fishery Reseat Title	rch Biologi	st GS-7 Grade	
Assistants: (Title a Vacant - Fishery Vacant - Fishery	Research Biologi	ist GS-7 (At	Sea)		
Collaborators:					
Necd for Information effect of fish	: One of the baing on the stocks	ssic parameters	necessary	for assessing	the

Objective: To determine the rate of fishing mortality that is generated by any given amount of dishing effort.

Method of Procedure:

Phase 1: Collect serial samples from the fishing grounds and determine relative abundance of the year classes present. Relate the decline in abundance of the exploited year classes to the amount of fishing effort expended on them and their natural mortality rate.

Sea Scarrop = Sheet No. 2	Sea	Scallop - 8 No.	2
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Filc No.:

Mothed of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	Needed by Laborator	ry for Complete Project	34.8
	FY <u>1959</u>	FY <u>1960</u>	FY 1961
Personal Services Other Expenses:	1.0	1.0	1.1
Within Project		94 64) Hall Prilitation Company of the Annal State (State	
Lab. Adm. & Ser.	2.0	3.1	3,1
Lab. Total	3.0	4.1	4.2
Regional Office Washington Office	.03	041	.042
Total			
Recommended Source of Fun		and Regular K, Regular, Contributed	, etc.)
Estimated Date of Complet	ion: Phase 1 FY 59	Phase 2 FY; Phase 3	FY ; Project FY
Recommended by: Originator L. A. 1	Posgay		8/6/59 <u>Date</u>
Investigation Chief	J. A. Po	sgay	8/6/59
Laboratory Director	Herbert	W Graham	8/6/59
Regional Director	Joseph 9.	Penercher	8/19/59
Branch Chief	1 21	HE.	12-24-59
Approved by: Division Chief for Direc	etor /		

Remarks

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 Filo No.

Research Project Outline

Title of Project: F	ishing mortality	rate fro	m tag returns	
Investigation Title:	Sea Scallops			
Investigation Chief:	J. A. Posgay			
Project Leader:	J. A. Posgay	Fishery Tit	Research Biologist	GS-12 Grade
Assistants: (Title ar	nd Grade)			
Vacant - Fishery Re Vacant - Fishery Re Vacant - Fishery Ai	search Biologist		(At Sea)	
Collaborators:				
Need for Information: effect of fishin		paramet	ers necessary for as	ssessing the
Objective: To determi given amou	ne the rate of Si nt of fishing eff	ishing mo	rtality that is gene	erated by any
Method of Procedure: Phase 1:	Tag and release recaptures and e fishing mortalit	effort exp	nbers of sea scallor pended in the area.	os. Record Calculate

Mothod of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	l Needed by Laborat	cory for Complete Projec	t <u>25.</u> 7
	FY <u>1959</u>	FY <u>1960</u>	FY <u>1961</u>
Personal Services	1.0	1.0	1.1
Other Expenses: Within Project	0.7	0.7	1.0
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	3.7	4.8	5.2
Regional Office Washington Office	•037	•048	.052
Total			
Recommended Source of F		and Regular -K, Regular, Contribute	d, etc.)
Estimated Date of Compl	etion: Phase 1 FY58	3;Phase 2 FY;Phase 3	FY Project IY 62
Recommended by: Originator	J. A. Posgay		8/6/59 <u>Date</u>
Investigation Chief	J. A.POSGA		8/6/59
Laboratory Director	HERBERT W.	GRAHAM	8/6/59
Regional Director	Joseph 4.	Puriocher	8/19/59
Branch Chief	1 2	HE	12-24-59
Approved by: Division Chief for Di	rector	A.	

Remarks

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 File No.

Research Project Outline

Title of Pro	ject:N	atural Mortalit	y Rate	Pi-Making (Anti-Maring) (Milliander) - Anti-Maring) - Anti-Maring)	
Investigati.o	n Title: s	ea Scallop	Mindul - 1988/1987 Mar John Serfeine Selffeit i 12 Mar 1894 (* 1. júlí 1. júlí 1. júlí 1. júlí 1. júlí 1. júlí	ar en ell eller - celulatio - reche de comparazione menero de come	Military. Additional resident control and an additional and additional additional and additional and additional and additional and additional and additional additional additional and additional additi
				seerch Biologist	
Assistants:					
Vacant - Fi Vacant - Fi Vacant - Fi	shory Resea	arch Biologist arch Biologist GS-4	GS-7 GS-7 (At	S ea)	
Collaborator	5:				
Need for Info effort	ormation: (of fishing	One of the basion the stocks.	c parameters	necessary for as	ressing the
Objective:		ine the average the selection n	annual rate range of the	of mortality of gear from causes	the sizes in other then fishing
Mothed of Pro		important fishi	ing grounds.	shells to live so Calculate the na from year to year	atural mortality

Sea Scallop -10 Sheet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Tota	l Needed by Laborate	ory for Complete Proje	ct 30.8
	FY 1959	FY <u>1960</u>	FY 1961
Personal Services Other Expenses: Within Project	0.5	0.5	<u>0</u> • 6
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	2.5	3.6	3.7
Regional Office Washington Office	.025	•036	.037
Total			
Recommended Source of F		and Regular -K, Regular, Contribut	€d, €tc.)
Estimated Date of Compl	etion: Phase 1 FY 59	Phase 2 FY Phase	3 FY ; Project FY
Recommended by: Originator J.	A. Posgay		8/6/59 <u>Date</u>
Investigation Chief	J. A. Pos	gay	8/6/59
Laboratory Director	Herbert W	Graham	8/6/59
Regional Director	Joseph 4.	Permitter	8/19/59
Branch Chief	VIJ	HE.	12-24-59
Approved by: Division Chief for Di	$egin{array}{ll} \mathbf{rector} & \mathcal{H} & \mathcal{H} \end{array}$	d.	and the

Remarks

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 Date: File No.

Research Project Cutline

Title of Project: Siz	e selection of sea scallop dredges	TRANSMAN - resident and the second
Investigation Title:	Sea Scallop	
	J. A. Posgay	
	A. Posgay Fishery Research Biologist	
Assistants: (Title and	Grado)	
Vacant - Fishery Reseavacant - Fishery Reseavacant - Statistical (arch Biologist GS-7	
Collaborators:		
Need for Information: probably take the a minimum mesh siz	Any management recommendations for this fish form of controlling the size at first capture.	nery will ne by specifying
Objective: To measure of rings ar	e the 50% selection point of dredges made up	od various sizes
	Make simultaneous tows of dredges with stand experimental mesh sizes. Record length-frequetch of each dredge. Calculate selection p	mencies of the

Shoet No. 2

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	l Needed by Laborato	ory for Complete Projec	16.9
	FY 1959	FY 1960	FY 1961
Personal Services	1.0	0.5	0.5
Other Expenses: Within Project		0.5	1.0
Lab. Adm. & Ser.	2.0	3.1	3.1
Lab. Total	3.0	4.1	4.6
Regional Office Washington Office	.03	.041	.046
Total			
Recommended Source of From Source of From Source of Complete Source of Source of From Source of Source	(S-	and Regular K, Regular, Contribute Phase 2 HY	•
Recommended by:	J. A. Posgay	January January	8/6/59 Date
Investigation Chief	J. A. Pos	gay	8/6/59
Laboratory Director	Herbert W		8/6/59
Regional Director	Joseph 7	Puniochias	8/19/59
Branch Chief Approved by:	1,24	WE	12-24-59
Division Chief for Dir	ector	- 11	1 4 4 E

Remarks

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959
Filo No.

Research Project Outline

Title of Project: Popu	lati <mark>on dynamic</mark>	s of G. B. Sea Sca	llop Fishery	
Investigation Title:Se		ini. Mittell Monattini alla tik silanda si silanda si jaka sa		· ·
Investigation Chief: J.	A. Posgay		"Makadid trak ker saat "Makadian papajada ke 17 saga	
Project Leader: J.	A. Posgay	Fishery Research Title	Biologist	(S-12 Grade
Assistants: (Title and	Grade)			
Vacant - Fishery Aid Vacant - Fishery Resea Vacant - Fishery Resea	rch Biologist			
Collaborators:				
	To make possib	le r eco mme n dation	s f or mana ger	men t of thi s
Objective: To determin and predict	e the optimum the effect of	age at first capt changes in these	ure and/or fi factors•	ishing effort
£	ishing mortali	rates of growth, ty with data on c l. Make recommen	atch and effo	ort into a

Sea	Scallop -	12	
	Shcet	No.	2

File No.:

Method of Procedure: (Cent'd)

Phase 3:

Estimated Costs: Total	Needed by Laborat	ory for Complete Projec	et <u>26.9</u>
	FY 1959	FY <u>1960</u>	FY 1961
Personal Services	2.0	1.0	1.5
Other Expenses: Within Project	gud dag bud		Quad (proj
Lab. Adm. & Ser.	2,0	3.1	3.0.
Lab. Total	4.0	4.1	4.5
Regional Office Washington Office	•04	.041	•045
Total			
Recommended Source of Fu		K and Regular -K, Regular, Contribute	ed, (tc.)
Estimated Date of Comple	tion: Phase 1 FY	;Phase 2_FY;Phase	FY ;Project FY (
Recommended by: Originator J.	A. Posgay		8/6/59 Date
Investigation Chief	J. A. Pos	sgay	8/6/59
Laboratory Director	Herbert V	V. Graham	8/6/59
Regional Director	Joseph G.	Preserve	8/19/59
Branch Chief	234	٤	12-24-59
Approved by: Division Chief for Dire	ector $\int \int dx dx$	+1	1. 4.
	<i>y</i>		

Remarks

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959
File No.

Research Project Outline

Title of Project: <u>Des</u>	and construction ign of temperat		experimental	tank.	
Investigation Title:	Scallops				
Investigation Chief:	J. A. Posgay				
Project Leader:	J. A. Posgay,Fi	shery Research	Biologist, G	S-12	
No ·	me	\mathtt{Title}		Grade	
Assistants: (Title and	l Gr ade)				
Collaborators:					
Need for Information:	new laborator controlled to	perform various ry, a reasonabl ank is needed. nexpensive and	y portable te ^T his tank sh	mperature ould be	the
	, build and tes	st a laboratory	experimental	. tank with	
Method of Procedure: Phase 1:	Pesi gn - Build an	tank nd test design.			

Sea Scallop-1

Shcet No. 2

Filc No.:

Method	of	Procedure:	(Cont'd)
TIC OILCIA	OT	rrocedure:	(contra)

Phase 3:

Estimated Costs: Tota	l Needed by Labor	atory for Complete Pro	ject <u>3.5</u>
	FY 59	FY	FY
Personal Services	0.5	pro peo	943 pai
Other Expenses: Within Project	1.0	ting (vid	
Lab. Adm. & Ser.	2.0	94 94	94 Pd
Lab. Total	3.5	(Fed deca	t=4 t=4
Regional Office Washington Office	.035		
Total			
Recommended Source of F . Estimated Date of Compl		ind Regular (S-K, Regular, Contribution) 59 Phase 2 FY ; Phase	•
Recommended by: Originator	Posgay		8/6/59 ^{Date}
Investigation Chief	J. A.	Posgay	8/6/59
Laboratory Director	Herber	t W Graham	8/6/59
Regional Director	Joseph	4 Vince her	8/19/59
Branch Chief	0 1	roted.	SHE.
Approved by: Division Chief for Di	rector /	WH .	
	· ·	no mlea	•

Remarks

(Continue on reverse side)

The tring feet is toward project

Sheet No. 1

Location: Woods Hole, Mass. Date: August 11, 1959 File No.

Research Project Outline

Title of Project: Time	and Cause of	formation of	annual ring.	
Investigation Title:	Sea Scallop			
Investigation Chief:	J. A. Posgay			
Project Leader: A. S.	Merrill	Fishery Rese	arch ^B iologist	GS-7 Grade
Assistants: (Title and	Grade)			
F. E. Nichy	Fishery Resear	ch Biologist	GS-7	
Collaborators:				
Need for Information:	the time and	—		udies but be different in
Objective: To determi	ine the time a	nd cause of th	e formation of a	annual rings•
Method of Procedure: Phase 1:	Observe when Correlate the	the ring forms	ironmental factor	-

Method of Procedure: (Contid)

Phase 3:

Estimated Costs: Total	l Needed by Laborat	tory for Complete Project	11.8
	FY <u>1959</u>	FY <u>1960</u>	FY 1961
Personal Services	1.0	1.0	1.0
Other Expenses: Within Project	0.5	0.1	0.1
Lab. Adm. & Ser.	2.0	3.1	3.0
Lab. Total	3.5	4.2	4.1
Regional Office Washington Office	.035	.042	.041
Total			
Recommended Source of Front Estimated Date of Comple	(5	d Regular -K, Regular, Contributed 9:Phase 2 FY ; Phase 3	
Recommended by:	A.Posgay		8/6/59 Date
Investigation Chief	J. A.	Posgay	8/6/59
Laboratory Director	Herber	t W. Gr a ham	8/6/59
Regional Director	fort	of Dewicelas	8/19/59
Branch Chief	<u> </u>	2414	12-24-59
Approved by: Division Chief for Dir	rector	1324	1216

Remarks

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959

File No.

Research Project Outline

icodifor Trojeco oddine
Title of Project: Seasonal cycle of gametogenisis and spawning
Investigation Title: Sea Scallop
Investigation Chief: J. A. Posgay
Project Leader: J. A. Posgav F. R. B. GS-12 Name Title Grade
Assistants: (Title and Grade)
A. S. Merrill F. R. B. GS-7 F. E. Nichy F. R. B. GS-7
Collaborators:
Need for Information: Many of the conclusions about sea scallops biology and the fishery depend upon the assumption of a single, main spawning season.
Objective: To determine the time and causes of spawning.

Method of Procedure:

Collect monthly samples from as many areas as possible. Conduct histological examination of the gonads. Correlate observed changes

with environmental factors.

Phase 2:

Phase 1:

Sea	Scallo	р 🗕	15	
	S	hcet	No •	2

Filc No.:

Mothed of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Tot	al Needed by Laboratory	for Complete Project	8.3
	FY <u>1959</u>	FY <u>196</u> 0	FY 1961
Personal Services Other Expenses:	quel paq mathalabet manage a constitue a transportung de paque	1.0	1.0
Within Project		0.1	<u>0.1</u>
Lab. Adm. & Ser.	Series Series	3,1	3.0
Lab. Total	\$10 \$10	4,2	4.1
Regional Office Washington Office	Martin Control	.042	.041
Total			
Recommended Source of . Estimated Date of Comp.		d Regular Regular, Contributed, hase 2 FY ; Phase 3 F	·
Recommended by:	J. A. Posgay		8/6/59 Date
Investigation Chief	J. A. Posgay		8/6/59
Laboratory Director	Herbert W. Gr		8/6/59
Regional Director	والمراب والمرابع	OCHAR X	8/19/59
Branch Chief	2/HE.		12-24-59
Approved by: Division Chief for D	irector // -#		
	7		
	Remarks		

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959

File No.

Research Project Outline

Title of Pro;	ject: Col	.ecti	on of spat.			
Investigation	Title:_S	ea S	callops			
Investigation	Chief:_	. A.	Posgay			
Project Leade		S. une	Merrill	FRB Title	GS-7 Grad	е
Assistants:	•		ide) Ni chy	FRB	GS-7	

Collaborators:

Necd for Information: Nothing is known about how or where sea scallops less than one inch maintain themselves.

Objective: To determine the time and place that sea scallops leave the plankton.

Method of Procedure: Set out spat collectors, inspect at intervals during the year. Inspect the fouling organisms on navigation buoys Phase 1: for newly set sea scallop spat.

File No.:

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	l Needed by Laborato	ory for Complete Project	13.5
	FY <u>1959</u>	FY <u>1960</u>	FY 1961
Personal Services	0.2	1.5	1.5
Other Expenses: Within Project	0.5	0.5	1.3
Lab. Adm. & Ser.	2.0	3.0	3.0
Lab. Total	2.7	5.0	5.8
Regional Office Washington Office	.027	.05	.058
Total			
Recommended Source of F		Regular -K, Regular, Contributed,	etc.)
Estimated Date of Compl	etion: Phase 1 FY59	;Phase 2 FY ;Phase 3 FY	;Project_FY 61
Recommended by: Originator	. A. Posgay		8/6/59 Date
Investigation Chief	J. A. Posgay		8/6/59
Laboratory Director	Herbert W. Gr	aham	8/6/59
Regional Director	Joseph 4.	marcher	8/19/59
Branch Chief	1 2418		12-24-59
Approved by: Division Chief for Di	rector /// 17		1. 1. 1.

Remarks

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959 File No.

Research Project Outline

	nescaren	Troject outline	
Title of Project:_	Seasonal and areal	l variation in the]	ength-weight ratio
Investigation Title	Sea Scallops		
Investigation Chief	f: J. A. Posgay	and the state of the	
Project Leader:	F. E. Nichy Name	FRB Title	GS-7 Grade
: Assistants: (Title	e and Grade)		
Collaborators:			
length but pop in weight calc	ulation dynamics caulated from the ave season, or place t	are measured in term alculations are made erage L-W ratio. If to place, it can ser	e in terms of growth this ratio varies

Objective: To measure the seasonal variation in the L-W ratio at several locations.

Method of Procedure: Collect samples at regular intervals from selected locations. Measure lengths, weigh meats, calculate L-W ratios, Phase 1: compare ratios seasonally and by area.

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total	Needed by Laborate	ory for Complete Projec	t <u>14.4</u>
	FY 1959	FY <u>1960</u>	FY 1961
Personal Services	grap perg	1.0	1.0
Other Expenses: Within Project		0.2	0.5
Lab. Adm. & Ser.		3.0	3.0
Lab. Total	F3 64	4.2	4.5
Regional Office Washington Office		.042	.045
Total			
Recommended Source of Fun	(₿-	nd Regular -K, Regular, Contribute	•
Estimated Date of Complet Recommended by: Originator J. A.	Posgay	; rnase z_ri; rnase j	#Y ; Project FY62 8/6/59 Date
Investigation Chief	J. A. Pos	gay	8/6/59
Laboratory Director	Herbert W.	Graham	8/6/59
Regional Director_	Joseph 4.	Vimertier	8/19/59
Branch Chief	U 1 24	HE	12-24-59
Approved by: Division Chief for Dire	ctor	T	

Remarks

Sheet No. 1

Location: Woods Hole, Mass. August 6, 1959

Date:

File No.

Research Project Outline

Title of Proje	ct: <u>Culture of Larvae</u>			
Investigation	Title: Sea Scallops			***************************************
Investigation	Chief: J. A. Posgav			
Project Leader	J. A. Posgay Name	FRB Title	GS-12 Grad	de
Assistants: (Title and Grade)			
	F. E. Nichy A. S. Merrill	FRB FRB	GS-7 GS-7	

Collaborators:

Need for Information: Nothing is known about the first years of life from egg fertilization to the formation of beds.

Objective: To develop a technique for maintaining cultures of sea scall.op larvae for experiments on survival and growth.

Method of Procedure: Set up cultures of phyto plankton which have proved to be suitable foods for polycepoel larvae. Induce spawning Phase 1: in ripe scallops.

Sea Scallop - 18 Sheet No. 2

File No.:

Mothod of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Needed by Labor	ratory for Complete Project 8.9	
FY <u>1959</u>	FY 1960 FY 1961	
Personal Services Other Expenses:	1.0 1.0	-
Within Project	0.4 0.5	
Lab. Adm. & Ser.	3.0 3.0	
Leb. Total	4.4 4.5	
Regional Office Washington Office	.044 .045	
Total		
Recommended Source of Funds	K and Regular (S-K, Regular, Contributed, etc.)	
Estimated Date of Completion: Phase 1 FY	60; Phase 2 FY; Phase 3 FY; Project F	_Y 61
Recommended by: Originator J. A. Posgay	Dat 8/6/59	e
Investigation Chief J. A. Po	osgay 8/6/59	
Laboratory Director Herbert	W./Graham 8/6/59	
Regional Director	Lunex Eca 8/19/59	
Branch Chief	24149 12-24-5	2
Approved by: Division Chief for Director	is the second second	

Remarks

Sheet No. 1

Location: Woods Hole, Mass. Date: August 6, 1959
File No.

Research Project Outline

Title of Project: The eff	ect of temperature upon larval mortality	& growth rates.
Investigation Title: <u>Sca</u>	Scallop	
Investigation Chief: J. A	. Posgay	
Project Landar: J. A	A. Posgay Fishery Research Riologist Title	GS-12 Grade
Assistants: (Title and Gra	.de)	
F. E. Nichy - Fishery F A. S. Merrill - Fishery F		
Collaborators:		
growth are known, it	the environmental 'actors which affect may be possible to predict the success on the condition of the environment at the t	f any vear-class
Objective: To determine the pelagic larvae.	ue optimum temperature for survival and g	routh of the
	Set up controlled experiments to establing temperature, measure the effect on survidepartures from this optimum.	sh the optimum val and growth of

Sea Scallop - 19
Sheet No. 2

Filc No.:

Method of Procedure: (Contid)

Phase 3:

Estimated Costs: Total	Needed by Laborator	y for Complete Proje	ct 21.1
	FY 1959	FY <u>1960</u>	FY 1961
Personal Services	eq eq	proj tred	2.5
Other Expenses: Within Project	ţra jan		2.0
Lab. Adm. & Ser.	(mi pag	feet first	3.0
Lab. Total	***	gwal gros	7.5
Regional Office Washington Office			.075
Total			
Recommended Source of Fun	(S-!	Regular K, Regular, Contribut	·
Estimated Date of Complet.	ion: Phase 1 FY 61;	Phase 2 FY Phase	3 FY Project FY 63
Recommended by: Originator	A. Posgay		8/.6/59 Date
Investigation Chief	J. A. Pos	gay	8/6/59
Laboratory Director	Herbert W		8/6/59
Regional Director	Joseph 1	Vinentia,	8/19/59
Branch Chief	<u>'</u> 24	149	12-24-59
Approved by: Division Chief for Direc	etor	47	

Remarks

Sheet No. 1

Phase 2:

Location: Woods Hole, Mass. Date: August 6, 1959
File No.

Research Project Cutline

Trote of tholeco:	Vertical distribut	ion of the pelagic larvae	
Investigation Title:	Sea Scallop	n 1888 januarinnah, 11 gilmilari (1 Jihasi ye de yê nêm. Napyeme ne ye (1 Jespanson manan pananga	
Investigation Chief:	J. A. Posgay	the provided country of the original handows described the substance of the original country of the or	
Project Leader:	J. A. Posgay Madae	Fishery Research Biologist	GS-12 Grade
Assistants: (Title a F. E. Nichy - Fis A. S. Merrill - Fis	shory Resoarch Bio	logist GS-7 logist GS-7	
Collaborators:			
Need for Information: but the	The sea scallop y have never been	is known to have a pelagic collected from the plankton	larval stage,
Objective: To deter find the	mine at what level pelagic stages.	l in the water column one car	n expect to
Method of Procedure: Phase 1:	satinity, light a	cultures at various condition and turbulence to see if they when laboratory experiments them at sea.	r have anv

Method of Procedure: (Cont'd)

Phase 3:

Estimated Costs: Total Need	ded by Laboratory f	or Complete Project	23.5
FY	1959	FY <u>1960</u>	FY <u>1961</u>
Personal Services	(re) (re)		3,2
Other Expenses: Within Project			2.0
Lab. Adm. & Ser.	400 tra	p=1 0=1	3.0
Lab. Total	Designed	¢mq žing	8.2
Regional Office Washington Office			.082
Total	,		
Recommended Source of Funds Estimated Date of Completion		gular, Contributed	
Recommended by: Originator J. A. Po		3	8/6/59 Date
Investigation Chief	J. A. Posgay		8/6/59
Laboratory Director	Herbert W. Gr	aham	8/6/59
Regional Director	Joseph 4	uniochan	8/19/59
Branch Chief	1 1 2849		12-24-59
Approved by: Division Chief for Director	. Wish		1. 1 66

Remarks